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THE HYDROIDS OF BERMUDA.

BY EDGAR DAVIDSON CONGDON.

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EDGAR DAVIDSON CONGDON.

Presented by E. L. Mark, November 14, 1906. Received November 2, 1906.

THIS paper has for its purpose the description of certain hydroids which I collected in the summer of 1903, while an attendant at the Bermuda Biological Station. They were investigated under the guidance of Dr. C. W. Hargitt in the Zoölogical Laboratory of Syracuse University. I wish to express my great indebtedness to Dr. Hargitt for his suggestions and criticisms, and to thank the Bermuda Biological Station for courtesies extended to me during the season.

Verrill ('99, p. 571) has stated in the Proceedings of the Connecticut Academy of Science that eleven hydroids occur at Bermuda, but he does not name or describe them. I know of no other zoölogist who has occupied himself with the subject.

Of the eighteen species that were found, eight were previously undescribed. Each species which had been previously described varied in some small degree from the type individuals. The various common hydroid families are quite equally represented. *Eudendrium hargitti*, a new species, is especially interesting because of phenomena of oögenesis which have been elsewhere described (Congdon, : 06). Two new species of Halecium present female gonophores whose structures are significant when compared with the gonophores of other species of the genus.

Few hydroids are found on the exposed southern shore of the Bermudas. The coves, inlets, and reefs of the opposite shore are well supplied with individuals and species. The Sargassum, which floats in after a prolonged south wind, often is the home of an abundance of *Aglaophenia minuta*, *Halecium*, and *Clytia simplex*.

Pennaria tiarella, *Eudendrium ramosum*, *Sertularia humilis*, and *Sertularella brevicyathus* are the most common species. *E. hargitti*, *Sertularella speciosa*, and *Thyroscyphus intermedius* are each confined to some single very restricted locality. In the few places especially favorable to hydroid life the strife for foothold is so marked that seven of the small species may be found growing on the larger ones.

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[1] Contributions from The Zoölogical Laboratory, Syracuse University; also Contributions from the Bermuda Biological Station for Research, No. 9.

The Bermuda hydroids show a close relationship to those of the West Indies and the Gulf of Mexico. All the genera of the new species and all but one of the species previously described are there represented. The remaining species, *Bimeria humilis*, has not to my knowledge been found south of New England.

FIGURE 1. Colony of *Eudendrium hargitti* (×10).

GENUS **PENNARIA** McCrady.

Pennaria tiarella McCrady.

The *Pennaria tiarella* of Bermuda has on the average three more filiform tentacles than that of Wood's Hole, Mass. Clarke ('79) described a member of this genus from Cuba, under the name of *P. symmetrica*, in which the gonosome was lacking. The characters which he considers specifically distinctive are: the exact form of the hydranth, the origin of the tentacles from a little above the base, and the presence of eighteen filiform tentacles. The first two characters vary greatly with age and the amount of food in the hydranth. The number of tentacles does not seem to me of specific importance, because it varies considerably, owing only in part, I think, to the degree of maturity. It seems probable that *P. symmetrica*, like the Bermuda form, is a geographical variety of *P. tiarella*.

GENUS **EUDENDRIUM** Ehrenberg (in part), 1832.

Eudendrium ramosum Linnaeus.

E. ramosum differs in three respects from the individuals of Wood's Hole, Mass. There is a slightly larger average number of tentacles; there may be one more lobe to the male gonophore; the hydranth to which the clusters are attached is often entirely aborted.

Eudendrium hargitti (new species). Figures 1–5.

This hydroid was found at only one place, a shallow inlet on the south shore of Bermuda (lat. 32° 16′ 50″, long. 64° 45′ 5″). It is a handsome little form with bright reddish brown hydranths and horny brown perisarc, which contrasts with the usual substratum of white coral sand (Figure 1).

Trophosome. Stem unfascicled; colony twenty to fifty millimeters long, becoming nearly transparent toward the extremities. Branches straight, few, nearly parallel to the main stem, distributed irregularly, joining stem by an abrupt bend. Annulations at bases of colony and branches, occasionally elsewhere. Hydranth most deeply colored at base of hypostome; tentacles from thirty-five to forty-five, in contraction forming two closely appressed rows; hypostome very mobile, contracting into a shallow cup or extending to a length greater than that of the hydranth body. Some hydranths provided with a groove near the base containing gland cells and thread cells.

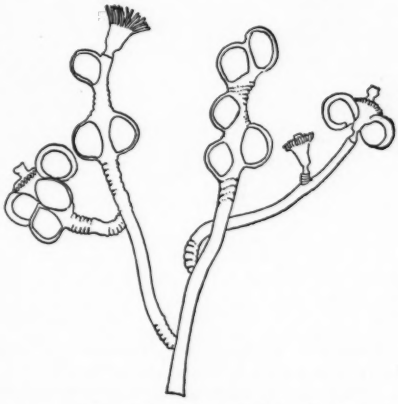
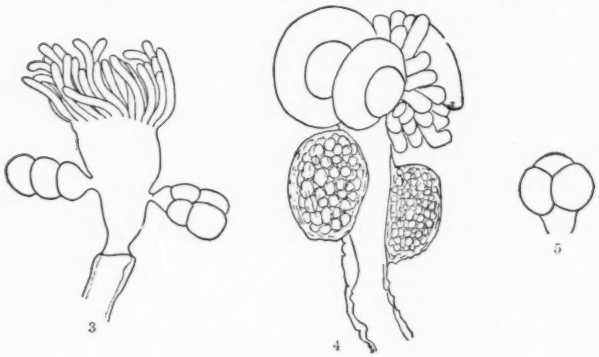


FIGURE 2. *Eudendrium hargitti.* Orthospadiceous and streptospadiceous gonophores (× 11).

Female Gonosome. Colonies dioecius. Two types of orange-colored gonophores (Figures 2, 4). One begins its development before the other, has an undivided spadix, consisting of a tube passing from the attachment upward and around the egg, and forms in conjunction with not more than four others a circle around the base of the hydranth body. The gonosomes of the second type are associated in clusters of two to seven closely and rather irregularly around a thick finely annulated pedicel, which may or may not have a terminal hydranth. They are partly confluent with the stem, ovoid, completely invested on the exposed side by a spadix, often indistinctly separated into a proximal and a distal group. A dozen clusters may occur close together on a basal

branch. Found toward the base of the colony always below the first type, whether occupying the same stem or not. A pedicel bearing this type may support a hydranth upon which the other type occurs.

Male Gonosome. Gonophores on an aborted hydranth and much annulated pedicel (Figures 3, 5). Three-chambered in a moniliform arrangement (Figure 3, left side) with but slight constriction between the lobes and their relative diameter variable. Four lobes may be



FIGURES 3–5. *Eudendrium hargitti.*

FIGURE 3. Hydranth with common type of male gonophore to the left and a less common form to the right (× 26).

FIGURE 4. Distal streptospadiceous and proximal orthospadiceous gonophores (× 12).

FIGURE 5. An unusual form of male gonophore (× 22).

arranged so as to form a diamond-shaped cluster, or another may be added proximally upon one side (Figure 3, right side).

The variability and simplicity of these gonophores in comparison with other Eudendria is suggestive of degeneration. This hydroid has the distinction of being the only member of the genus whose egg is known to grow by the absorption of other cells.

It is a pleasure to name this species after Professor Charles W. Hargitt. To those who, as students of the Hydromedusae, are acquainted with his various contributions relating to problems of the group, the reason for so doing is apparent.

Genus BIMERIA S. Wright, 1859.

Bimeria humilis Allman. Figure 6.

Dense growths of the colonies of this small animal are to be found on Eudendrium, Pennaria, sponges, and the like. The stem of Pennaria often forms the centre of a cylindrical mass a centimeter in diameter. No gonosome is present.

The genus Bimeria was established in 1859 by Strethill Wright for a hydroid of the Firth of Forth, characterized by a covering of perisarc on the hydranth body and around the bases of the tentacles (Allman, '**71**, p. 297). Allman ('**77**, p. 8) added to the genus the species *B. humilis* from the Tortugas, which differs but slightly from the Bermuda Bimeria.

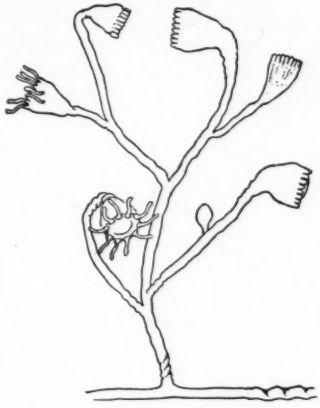


FIGURE 6. Colony of *Bimeria humilis* (× 18).

Gonosome is lacking. In two respects the hydroids differ. The Tortugas form has a very opaque perisarc as described by Allman; in the Bermuda form it is transparent; but descriptions of other species added to the genus later by different authors suggest by their dissimilarity that in regard to this character individuals may vary in appearance. Secondly, Allman states that he was not able to detect the ends of the tentacle tubes and his figures do not show them. By focussing on the end of an expanded hydranth, I had no difficulty in finding them. There is thus no warrant for constituting a new species unless the gonosomes reveal differences.

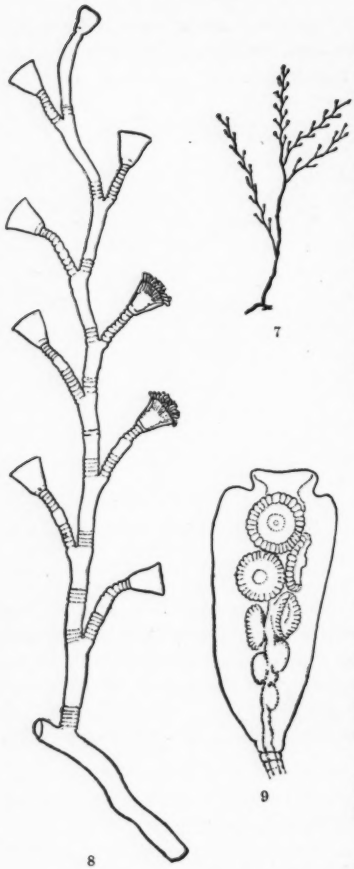
Genus LAFOEA Lamouroux, 1812.

Lafoea calcarata A. Agassiz.

A small number of colonies were found growing around the base of a hydroid. Unfortunately the collection was lost before it could be examined at length.

GENUS **OBELIA** Péron and Leseur, 1809.

Obelia hyalina S. F. Clarke. Figures 7–9.



FIGURES 7–9. *Obelia hyalina.*

FIGURE 7. Colony (× 3).
FIGURE 8. Colony (× 30).
FIGURE 9. Gonotheca (× 60).

Obelia hyalina grows on sponges, algae, and large hydroids which inhabit the shallow waters of Bermuda (Figures 7, 8). Stems and branches may develop short stolons. The branches are described by Clarke as arising from the axils of hydrothecae. I found them more commonly resulting from the extension of pedicels. The gonothecae which Clarke found were evidently immature, since they are figured with a truncate end. Later these develop a small aperture surrounded by a flaring rim (Figure 9).

GENUS **CAMPANULARIA**
Lamouroux (in part) 1816.

Campanularia insignis
Allman. Figures 10–12.

The animal lives in all the localities along the shores of Bermuda where hydroids are plentiful. The trophosome (Figure 10) was described by Allman from a dredging of the Challenger expedition in thirty fathoms of water off the coast of Bermuda. I have to add a description of the gonosome.

An interesting character not to my knowledge elsewhere found in the genus Campanularia, is the vegetative reproduction through the agency of stolons, much as takes place in plants by creepers

(Figure 11). The outgrowths arise from the ends of the stems and branches or may replace the latter. They are present in colonies of all sizes and are most abundant at the distal end. By their elongation, sometimes aided by a bending of the colony, their tips come in contact with the substratum. A clump of rhizoids forms and a new colony rises from them. Only a small proportion of the stolons were engaged in this process. Hincks ('68, p. 170) figures similar stolons on *C. angulata*, but they were not seen to give rise to colonies.

Nutting (:00, p. 44) has seen a species of Aglaophenia in the act of conjugating by means of stolons. A hooked stolon of one colony catches a similar structure of another. Fusion occurs, and after a resting period of three months a colony arises at the point of contact.

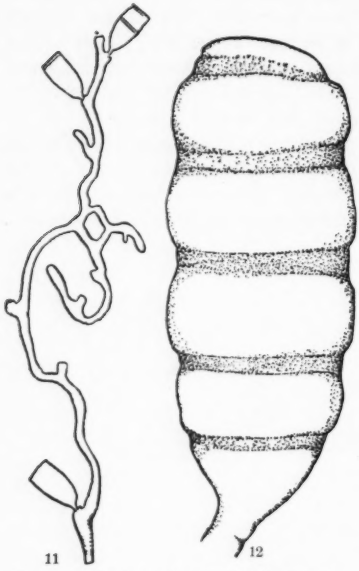
FIGURE 10. *Campanularia insignis.* Branch and part of main stem, showing two types of gonophores (× 4).

Though I found no case of fusion in many hundred colonies, the possibility of its occurrence is suggested by the hooked ends of the young stolons. Sometimes a small hooked stolon arises perpendicularly from near the end of another. As the branches grow larger, the hook gradually straightens, until there is but a slight curve, as found in *C. angulata*, *S. pumila*, and other species.

Gonosome. I found two types of gonothecae. The one was cylindrical and divided into about five lobes by regular and broad furrows (Figures 10, 12). It was not apparent from their structure whether they were female or immature male gonothecae, and I was not able to investigate their histology. The other form was ovoid with a constricted opening and a single male gonophore (Figure 10).

The spermatozoa develop in gonothecae instead of in medusae. A thick layer of sperm mother-cells lies next the mesogloea in the entoderm.

Mature gonothecae within this layer have a zone of degenerating, ill defined, columnar cells, whose fate I have not followed. The ectoderm was also found undergoing retrogressive change while the sperms were nearing maturity. It would seem probable that the entoderm furnishes nourishment for the spermatic layer from its own substance at this stage, while at an earlier period of growth it passes food onward from the central cavity to it.



FIGURES 11, 12. *Campanularia insignis.*

FIGURE 11. Young colony growing from a stolon (× 4).

FIGURE 12. One of the types of gonotheca, sex undetermined (× 40).

There are minor points of structure which require to be reconciled with Allman's description of *Campanularia insignis.* He gives the height of large colonies as nine inches. Although I found none having more than half that height, this is so variable a feature that it should have little weight. The rim of the hydroid is described by Allman as narrow and more transparent than the rest. In his plate it is represented by a line parallel to and just below the edge. My collections show the extreme border of the hydranth set slightly inward from the general surface. Two or three grooves may appear encircling the hydrotheca, but the top one may occasionally be lacking.

Allman places his species only provisionally in the genus Campanularia because of lack of gonosome. The character of the gonosome as described above settles the question of genus, placing the hydroid among the Campanularia.

GENUS **CLYTIA** Lamouroux (in part), 1812.

Clytia fragilis (new species). Figure 13.

The hyaline colonies of *Clytia fragilis* occur in company with *Halecium bermudense* on *Pennaria tiarella.*

Trophosome. Colonies twelve to eighteen millimeters long, the small diameter of the stem and the hyalinity of the perisarc giving the appearance of fragility. Short, strongly marked nodes, ending below with an abrupt curve and attached to the side of the next lower node; ending above, apparently in the pedicel of a hydranth. Stem geniculate, somewhat curved in each node. Hydranths alternate. The branches, which arise from the growth of a pedicel, given off irregularly, duplicating the structure of the stem. Annulation at lower end of node, sometimes extending well up or occurring midway in its length (Figure 13).

Hydrothecae campanulate, elongated, with nearly straight sides, tapering most abruptly close to pedicels. Rim with twelve to fourteen pointed teeth separated by rounded edges. In old individuals the walls often folding and cracking longitudinally, causing the hydrothecae to collapse; the teeth in part breaking off, producing an irregular edge. Diaphragm with a small opening sometimes quite far from base of hydranth. Pedicels often as long as a node. If entirely annulated there are from ten to twenty rings.

Gonosome. Gonothecae attached closely to base of a hydranth pedicel, or carried away from the stem by its elongation, nearly twice as long as hydrothecae, flattened, ovoid, truncate above, with a flaring ring and tapering to the short annulated pedicel. There may be some suggestion of annulation on the wavy surface. About six medusa buds can be found on the blastostyle. Their bells are deep and their manubria large. The presence of four tentacles indicates the genus Clytia.

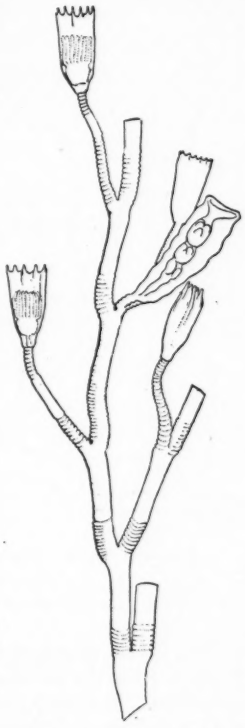
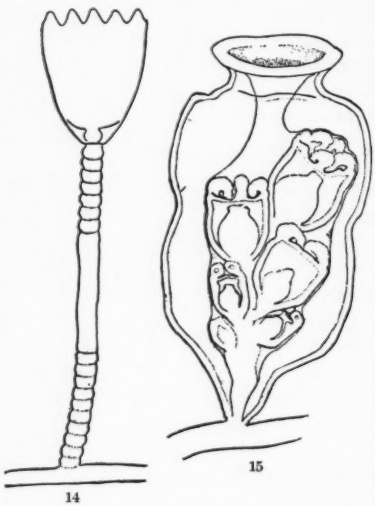


FIGURE 13. *Clytia fragilis.* Half of a colony bearing a gonotheca (× 18).

Clytia simplex (new species). Figures 14, 15.

This hydroid is only a little less abundant on Sargassum than *Aglaophenia minuta.* It grows on some of the larger Bermuda hydroids.

Trophosome. Minute white colonies, seldom ten millimeters long, arising rather sparsely from a creeping stolon, bearing a deeply campanulate hydrotheca, pedicel annulated most commonly at both ends, (Figure 14), hydrothecae only one and one-third to twice as long as wide, the proportion depending on the age and condition of expansion of hydranth. Ten to twelve triangular teeth, more or less rounded and of varying proportions. Wall of hydrotheca thickened below hydranth to form a spheroidal cavity. Hydranth of usual type with twenty to twenty-four tentacles.



FIGURES 14, 15. *Clytia simplex.*
FIGURE 14. An individual (× 18).
FIGURE 15. Gonotheca (× 60).

Gonosome. Gonothecae arising from stolons, sessile, twice as long as hydrothecae, ovoid and flattened, distal end truncate and flaring, and of one half to two thirds the diameter of the gonothecae (Figure 15). About eight medusa buds are attached along the blastostyle, of which the most mature are campanulate in form with four tentacles and four other rudimentary organs interradial in position. The manubrium may occupy half the space within the bell, is nearly spherical, and apparently not provided with any terminal lobes.

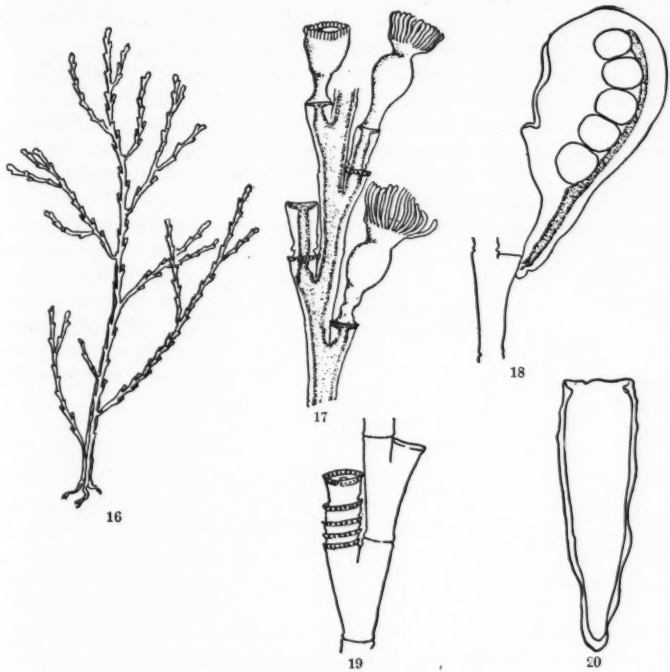
This Clytia combines the unbranched habit of *C. bicophora* and *C. grayi* with the non-annulated or weakly annulated gonosome of *C. cylindrica.* The teeth of the hydrothecae are less pointed than those of *C. bicophora*, and, though as rounded as those of *C. grayi*, are much more deeply cut. The specific name "simplex" is suggested by the marked simplicity in the form of trophosome and gonosome.

GENUS **HALECIUM** Oken, 1815.

Halecium bermudense (new species). Figures 16–20.

The hydroid occurs in those places along the shores of Bermuda which are most frequented by related species.

Trophosome. Colonies delicate and graceful, with hyaline or brownish perisarc, usually twenty to thirty-five millimeters long, main stem and large branches fascicled in part, elsewhere slightly geniculate (Figures 16, 17). Branches irregularly placed, arising from below hydrophores, when young, by an abrupt curve, which later is less apparent; occasionally, toward the end of larger branches, arising midway between hydrophores. Branches may twice subdivide. They tend to form a cluster at the tip of the colony.



FIGURES 16–20. *Halecium bermudense.*

FIGURE 16. Colony (× 4).
FIGURE 17. Part of a colony (× 24).
FIGURE 18. Female gonotheca (× 27).
FIGURE 19. Compound hydrophore (× 30).
FIGURE 20. Male gonotheca (× 27).

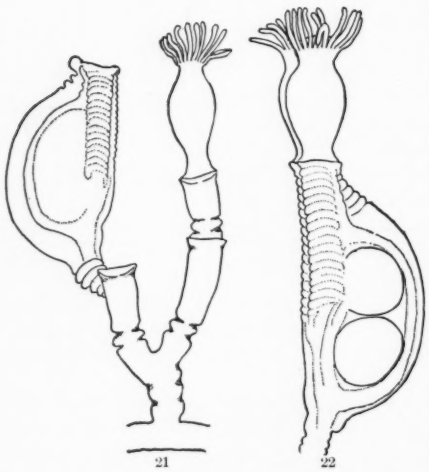
Hydrophores alternate, very shallow, with usual ring of refractile

bodies; in the older part of the colony quite largely double, occasionally seen with seven divisions (Figure 19). Annulations above each hydrophore divide the stem into nodes, others at base of branches and occasionally elsewhere. Hydranths large with rounded hypostome and twenty to thirty tentacles.

Gonosome. Colonies dioecius. Gonothecae sessile at the axils of hydrophores, sometimes found arising from hydrophores.

Female gonotheca ovoid, flattened, with a short pedicel-like base, one side open for two thirds its length, the edges of the opening forming similar compound curves (Figure 18). The blastostyle extends up around the opposite side, curving toward the opening. The development of the eggs is accompanied by the breaking down of the tissue between them and the opening.

Male gonotheca (Figure 20) cylindrical and unusually slender, truncate, and tapering toward base, often marked by an irregular encircling groove somewhat wavy in outline, one third the way from the base.



FIGURES 21, 22. *Halecium marki.*

FIGURE 21. Colony (× 60).

FIGURE 22. Female gonotheca and hydranths (× 75).

Halecium marki (new species). Figures 21–23.

The creeping stolons of this species form a network over the Sargassum and to a less extent cover the bases of some of the large Bermuda hydroids.

Trophosome. Colonies are commonly one and a half to three millimeters high (Figures 21, 23). A thick layer of spherical, unicellular algae extending through the coenosarc of the entire colony colors it green. A colony begins its growth as a single hydrophore arising from a stolon. Its structure, like other hydrophores, is typically that of a cylinder; it is three times as long as broad, with a

flaring end and one or more deep annulations at the base. Growth in a straight line may result from the addition of successive hydrophores. Their rims are outside the walls of the next in the series and so may be lost off. Pairs of branches arise as hydrophores, attached by short abrupt curves to the opposite sides of a hydrophore, or, less frequently, but one occurs. There is no especial order in the arrangement of hydrophores. Small colonies result, whose units are partly branching and partly linear. Seldom are there more than four hydrophores in a series; stolons in a few instances were found terminating branches.

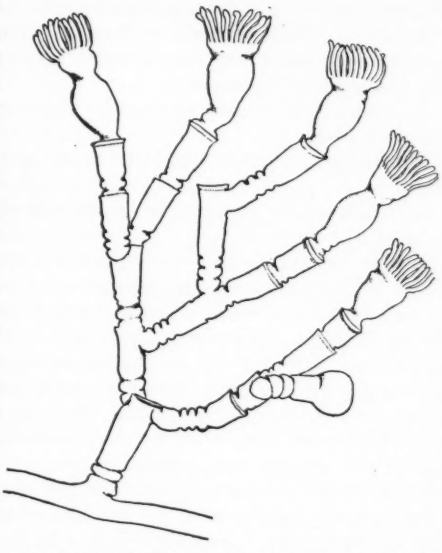


FIGURE 23. *Halecium marki.* Large colony (× 60).

Large and slightly retractile hydranths terminate each branch. There are sixteen to twenty-five tentacles and the hypostome is short and rounded.

Gonosome. Ovoid gonothecae take the place of branches (Figures 21, 22). Most colonies examined had from one to three of them. Male and female gonothecae occur on colonies attached near to each other on the stolon. The constricted opening and the short deeply annulated pedicel make a straight line down one side. Midway upon it two delicately annulated tubes arise, which are closely confluent with each other and with the gonotheca. At the curiously annulated mouth of the latter they end as hydrophores which bear hydranths.

The blastostyle in either sex is joined with the coenosarcal column, which branches into the two tubes. The single female gonophore contains two large eggs, one above the other. The male gonophore is also single and ovoid.

Halecium beanii is the only species of the genus which has a gono-

phore in any way similar to this. It falls in a natural group with the other species here described, *H. beanii*, *H. dichotomum*, *H. sessile*, and *H. bermudense*, because all have large hydranths, shallow hydrophores, and slipper-shaped female gonothecae. It is of interest for purposes of comparison to arrange the salient characters of the female gonophores of these forms in an order suggested by their structure.

H. marki. Female gonotheca has two tubes, each bearing a hydranth, which reach from the centre of the gonophore to its summit. The opening is at the summit.

H. beanii. Tubes much shortened and mouth at top on a level with the tubes.

H. dichotomum. Only one tube springing from the side half-way down.

H. sessile. Like *H. bermudense*, but the opening at top and the remains of tube gone.

Though recognizing that caution should be used in formulating theories as to the development of animal structures from such comparisons as are suggested above, it seems to me that the facts point forcibly to the origin of the slipper-shaped gonotheca in the following way. The gonotheca structure in the present species suggests that a hydrophore bearing a gonotheca also gave rise to a branch on either side, the latter a common condition in the species. The two branches with their terminal hydranths then became fused with the gonotheca. In this species the fusion is complete half-way up the gonotheca. Next the tubes shortened further by a contraction of their upper part until they became mere openings and the aperture of the gonotheca remained near to them, as in *H. macrocephalum*. In *H. bermudense* the opening is elongated toward the top. *H. sessile* and others have the opening at the top, but retain the slipper-like form.

Genus SERTULARELLA Gray (modified), 1847.

Sertularella speciosa (new species). Figures 24-28.

This form was found only at the opening of an underground passage connecting Harrington Sound and Castle Harbor (lat. 32° 20′ 30″, long. 64° 42′ 10″).

Trophosome. Colonies fascicled, truncate, usually five to eight inches high (Figures 24, 28). Occasionally a large branch occurs resembling the main colony. Pinnae alternate, making an angle of eighty degrees with the stem, divided into nodes at intervals of some five hydrothecae by grooves slanting alternately in opposite directions. Stolons occur at ends of stems and branches.

Hydrothecae alternate, embedded in stem or pinna nearly to the opening, separated by a considerable space from each other, cylindrical and flattened laterally, the lower end tapering slightly, with no line marking its union below and no diaphragm, the upper end bending out at an angle of sixty degrees. The hydrothecae of the branches grow from a pair of tubes on opposite sides of the stem. There are usually three between successive pinnae on one side, one of which is just above the origin.

The opercula of young hydrothecae have four, or occasionally five, ridges, terminating in corresponding projections of the edge; one abcauline, and the others symmetrically placed. Operculum usually first ruptured at centre. Four ragged lobes or a rim may remain until maturity, but they are more commonly lost. Projections usually persist, becoming less distinct. Two or three rings usually found below the edge of old hydrothecae.

Expanded hydranths trumpet shaped, hypostome conical, tentacles twenty to thirty. A blind sack is attached to abcauline wall of hydrotheca, from which projects a transverse edge.

Gonosome. Colonies dioecious. Male and female gonothecae, arising from pinnae, externally similar, equal to five hydrothecae in length (Figure 26). Theca hyaline, cylindrical, distally truncate, proximally constricted for one fourth its length into a pedicel-like base. Axis slightly curving, markings of surface often very faint, consisting of eleven longitudinal ridges terminating in lobes along the distal margin, separated by more faint parallel ridges and six or eight broad shallow circular

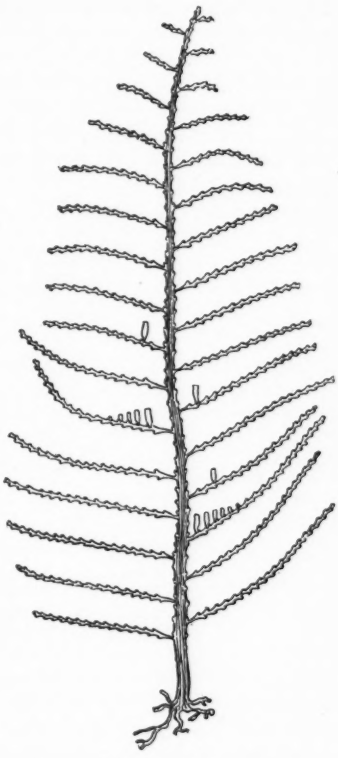
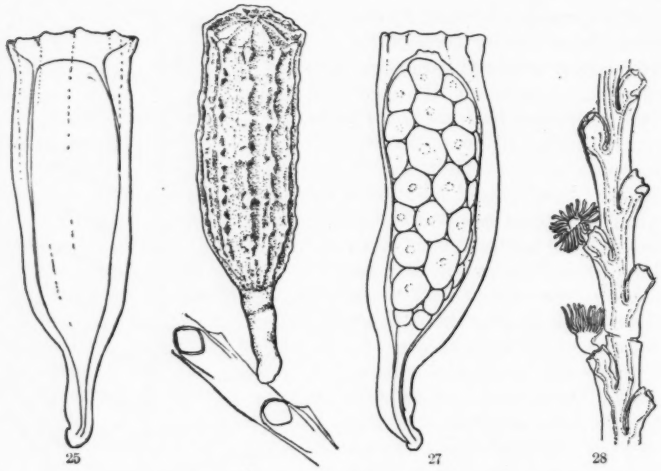


FIGURE 24. *Sertularella speciosa.* Colony with gonothecae (× 1½).

grooves. Top has radial ridges terminating in the lobes. Gonothecae attached below hydrothecae, one or two near base of branches, or a series decreasing in size distally or otherwise arranged. Female gonothecae with gonophores filling the cavity containing about forty eggs arranged around a lumen (Figure 27). The male gonothecae similar (Figure 25).

I examined the structure of the stem by macerating it in caustic potash. Twenty tubes occur near the base of a small colony and four



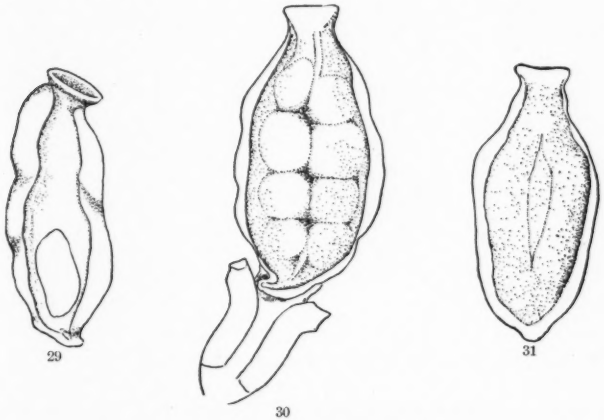
FIGURES 25–28. *Sertularella speciosa.*

FIGURE 25. Male gonotheca (× 30).
FIGURE 26. Female gonotheca (× 30).
FIGURE 27. Female gonotheca (× 30).
FIGURE 28. Part of branch (× 22).

near the top. They extend for various distances upward to terminate by joining others. The rhizoids consist of tubes which themselves unite near the base of the colony much as do the former. In each colony there is one large hydrothecae-bearing tube which gives rise to the pinnae of one side near the base and further up for both sides. It arises from a union of other tubes near the base of the colony and traverses the entire stem. Pinnae on the side opposite the large tube arise from tubes which become hydrothecae-bearing for a short distance, give off two or three other branches, and then terminate in a tapering

process which joins another tube of similar structure. The large tube and all hydrothecae-bearing tubes are segmented, as well as the others, just before uniting with them.

The present species is an illustration of the difficulty which is found in delimiting the genus Sertularia and some other genera of the same family. The genus is confined by Nutting (: **04**, p. 37) to those species in which the operculum is well defined or stretched tightly over the top of the hydrotheca. Though neither condition occurs here, the characters of hypostome and gonosome place the species unmistakably in this genus. *Thuiaria pinnata*, described by Allman from the Double-headed Shot Key, is similar in trophosome, but the hydrothecae are less confluent (Allman, '**77**, p. 28). The gonosome is not known. *Ser. tularella distans* is also much like this species (Nutting, : **04**, p. 88). The stem is, however, unfascicled and the hydrothecae provided with a constant border.



FIGURES 29–31. *Sertularella humilis.*

FIGURE 29. Female gonotheca, one egg remaining (× 25).
FIGURE 30. Female gonotheca, eggs not discharged (× 25).
FIGURE 31. Male gonotheca (× 25).

GENUS **SERTULARIA** Linnaeus (in part), 1767.

Sertularia humilis (new species). Figures 29–32.

This is one of the hydroids most common at Bermuda. It grows so abundantly between tide marks as to make thick brown mats, which

frequently contain coral mud and diatoms. Doubtless it is protected at low tide by its denseness, which mitigates desiccation. The name refers to its humble appearance.

Trophosome. Colonies are a deep horn color, pinnate, unfascicled, thirty to forty millimeters long. The sometimes geniculate stem is constricted below each of the ten or more alternate pinnae (Figure 32).

Three sessile hydrothecae usually found on each joint of stem, most frequently two on the same side as the pinna, the other sub-opposite the more distal. Variations in arrangement are found, such as two pairs

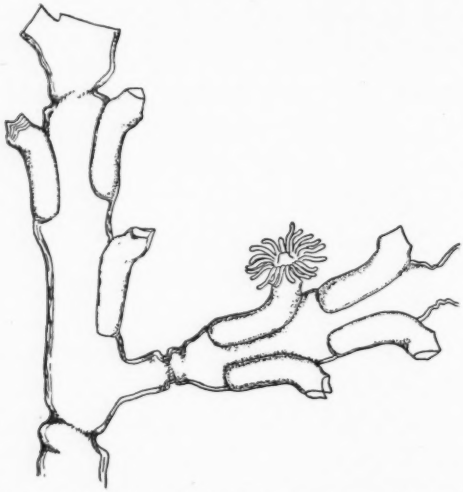


FIGURE 32. *Sertularella humilis.* Part of main stem and branch (× 25).

of opposite hydrothecae on a joint. The flattened pinnae with two or three pairs of opposite, or slightly sub-opposite, hydrothecae to a segment. Base of stem and pinnae devoid of hydrothecae.

Hydrothecae of stem and pinnae tubular and two or three times as long as wide for the lower two thirds of their length, and at the base confluent with the stem. Above, bending outward at an angle of thirty-five to forty-five degrees, and also slightly toward each other. On this side the intervening space usually not so wide as a hydrotheca, though width increases with age. Outer border of hydrotheca continuous with border of stem or pinna, which extends proximally for a short distance to the next hydrotheca or constriction. The confluent

portion of the hydrotheca diverges from the axis to a small degree, distally. There is a proximal diaphragm.

Edge of hydrotheca provided with a single adcauline and abcauline scallop, each of which is marked by a slight projection at its centre. In older hydrothecae several parallel ridges near the edge and operculum may be largely torn away; in younger consisting of three parts, meeting in ridges extending from the centre to the three projections. A lateral view of the colony presents the edge of many opercula, but shows the upper valve of some.

Gonosome. Colonies dioecious. Form of gonotheca the same in both sexes (Figures 29–31), more than twice as long as hydrothecae, ovoid, with a flaring mouth. They are most abundant in proximal part of colony, attached to hydrothecae just below diaphragm. A gonotheca was once observed rising from the interior of a hydrotheca. Characteristic markings may have been lost as the gonothecae were not well preserved. About sixteen eggs in the single large gonophore (Figure 30). Male gonothecae of similar appearance.

Sertularia brevicyathus Versluys.

So prolific is this little animal in some places that one can hardly pick up a piece of sponge, seaweed, or large hydroid without finding a dense growth attached.

Versluys ('**99**, p. 40) first described it from the Cape Verde Islands, and later Nutting (:**04**, p. 60) from the Bahamas. Neither author came upon the rather infrequent branches, which are attached at an acute angle just below the hydrothecae and differ in no respect from colonies.

Stolons are not uncommon. They may be given off like branches or from the tip of the colony. In the latter case they are often as long as a colony. If a number occur in one colony, they are arranged in pairs or are irregularly distributed.

The gonosome has not been previously described. Gonothecae are usually solitary on a colony, and attached just below a basal hydrotheca. Both male and female gonothecae are sessile, with a constricted opening, a low flaring lip, and wavy surface. They are closely similar to the gonothecae of *S. pumila.* These have been so completely described by Weismann as to render further account unnecessary.

Sertularia versluysi Nutting.

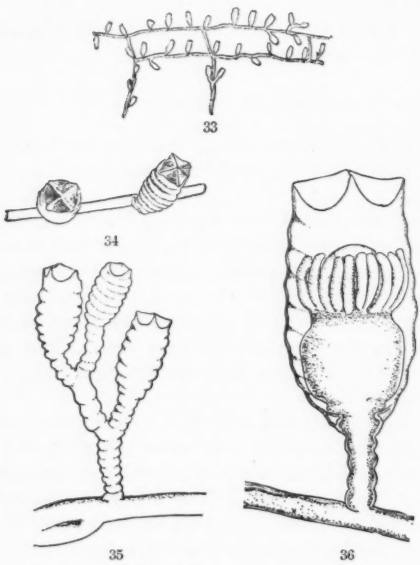
Sertularia versluysi was first described by Allman from dredgings off the coast of Bermuda in thirty fathoms. I have only a few colonies, which I found on floating Sargassum.

Versluys believed the animal had an operculum with a single abcauline flap. Nutting (: **04**, p. 53) was inclined to think there were two flaps on his badly ruptured specimen. Material in good condition shows that there are two large lateral projections from the edge of the hydrotheca and a smaller adcauline one. The three parts of the operculum meet in ridges along lines passing from the centre of the opening to the projecting points.

Genus THYROSCYPHUS Allman, 1877.

Thyrocyphus intermedius (new species). Figures 33–36.

My only collection of this new form is from the eel grass of a shallow, muddy cove of Mangrove Bay (lat. 32°18′ 10″, long. 64° 51′ 30″). Hydrothecae usually single, with pedicels one and a half millimeters long (Figure 36). A small proportion have two or three hydrothecae, whose annulated, geniculate, erect stems resemble elongated stolons (Figure 35). A terminal hydrotheca is found at one end of the axis and one or two others are attached at geniculations. The annulated pedicels are shorter than hydrothecae; when single, not more than a third as long.



Figures 33–36. *Thyroscyphus intermedius.*

Figure 33. Colony (× 1¼).
Figure 34. Hydranths, showing operculum (×7½)
Figure 35. Colony (× 10).
Figure 36. Hydranth (× 60).

Hydrothecae (Figure 36) are more than twice as long as wide, nearly cylindrical, marked by eight or more annulations, and tapering slightly toward the top. An operculum is formed by the bending of the

hydrotheca wall to form four deep symmetrical scallops. The edges meet in two deep intersecting ridges, which terminate at the four points between the scallops (Figure 34). The narrow diaphragm consists of a fold which encloses a considerable space.

Colonies arise from creeping stolons, which are as large as a pedicel and not annulated (Figure 33). They grow parallel to each other along the blades of eel grass, sending frequent connecting branches across to neighboring stolons.

The few well-preserved hydranths are contracted into the lower half of the hydrotheca. They are attached to the diaphragm only, possibly because of unsatisfactory killing. There are about twenty tentacles and the hypostome is rounded.

The characters of the trophosome are allied to both Campanularidae and Sertularidae. The occurrence of diaphragm, pedicel, and an ovato-cylindrical annulated hydrotheca suggest the former. Yet we do not find a four-part operculum in that family except in the genus Thyroscyphus, erected by Allman in 1877 for the single species *T. ramosus*, which is of doubtful affinity (Nutting, **:04**, p. 10). The jointed stem, shortness of pedicel, and four-part operculum suggest its close relation with the genus Sertularella. If the gonosome is of the Sertularella type, the existence of a pedicel would be the only character separating it from that genus.

The genus Sertularella as revised by Hartlaub contains species with a hydrotheca and operculum closely similar to the Bermuda hydroid. The one character in which it differs from the genus is the presence of a pedicel. This difference Allman judged so important in the case of *T. ramosus* as to demand a new genus. I have accepted his view of the matter.

The chief differences between the two species, as far as we now know, are these: *T. ramosus* is larger, has a bordered hydrotheca, and a jointed stem bearing many hydrothecae instead of a short, annulated, unjointed one bearing at most three hydrothecae.

Genus AGLAOPHENIA Lamouroux, 1816.

Aglaophenia minuta Fewkes. Figure 37.

This form is rather widely distributed. It occurs on the Sargassum, which drifts to Bermuda from the south. Though I did not find the gonosome, the complex trophosome was sufficient for identification. A small nematophore is always present on each side of the axil of a branch. The fact is not mentioned by Fewkes nor in the fuller description by Nutting.

GENUS **LYTOCARPUS** Kirchenpauer, 1872. Figure 37.

Lytocarpus philippinus Kirchenpauer.

Lytocarpus philippinus is found at the places where hydroids most abound along the shores of Bermuda. It was also dredged from the Challenger banks, south of Bermuda. It was first described by Kirchenpauer from the Philippine Islands, and since has been noted from many stations in the Pacific and from Jamaica.

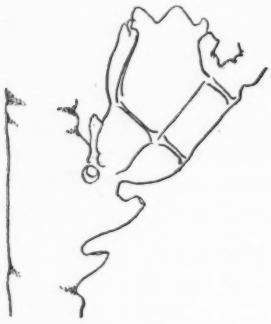


FIGURE 37.

Lytocarpus philippinus. Base of pinna (× 105).

The following slight variations from the description and plate of Nutting are to be found: the mesial nematophore is longer; the intrathecal ridge nearer the base, and the colony shorter.

GENUS **PLUMULARIA** Lamarck, 1815, modified by Nutting, 1900.

Plumularia alternata Nutting.

Nutting has described this form from a collection made by Agassiz at Barracuda Rocks during the cruise of the "Wild Duck" in 1893. I found it to be one of the less common hydroids growing upon the floating Sargassum in the vicinity of Bermuda. The gonosome is not known.

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July, 1906.

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